

## Immune System Responses

<http://www.youtube.com/watch?v=z3M0vU3Dv8E>

Pathogen - a disease causing agent -  
bacteria, virus, fungi, protist - *protozoan*

i) What are non-specific first lines of defense against infection? Provide examples

- attack all threats (pathogens) by preventing them from entering the body
- include skin, mucus, sweat, tears, stomach acid
- ex. tears contain an enzyme called lysozyme which can destroy pathogens, sweat is acidic which can kill pathogens

ii) What are second lines of defense against infection?

- if pathogen does enter - inflammatory response occurs

A. Non specific

- white blood cells (phagocytes) enter the infected area and try to engulf the pathogen
- chemicals are also released to increase body temperature (fever), this slows down or stops growth of pathogen
- interferons are produced to inhibit production of proteins needed in viral reproduction

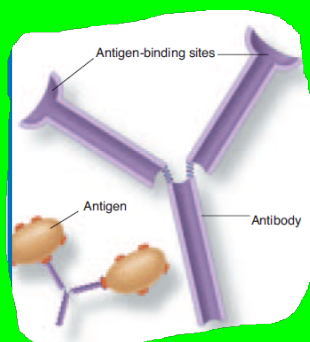
Antigen - a protein marker that triggers an immune response

Antibody - proteins that bind to antigens

## B. Specific Humoral Immunity

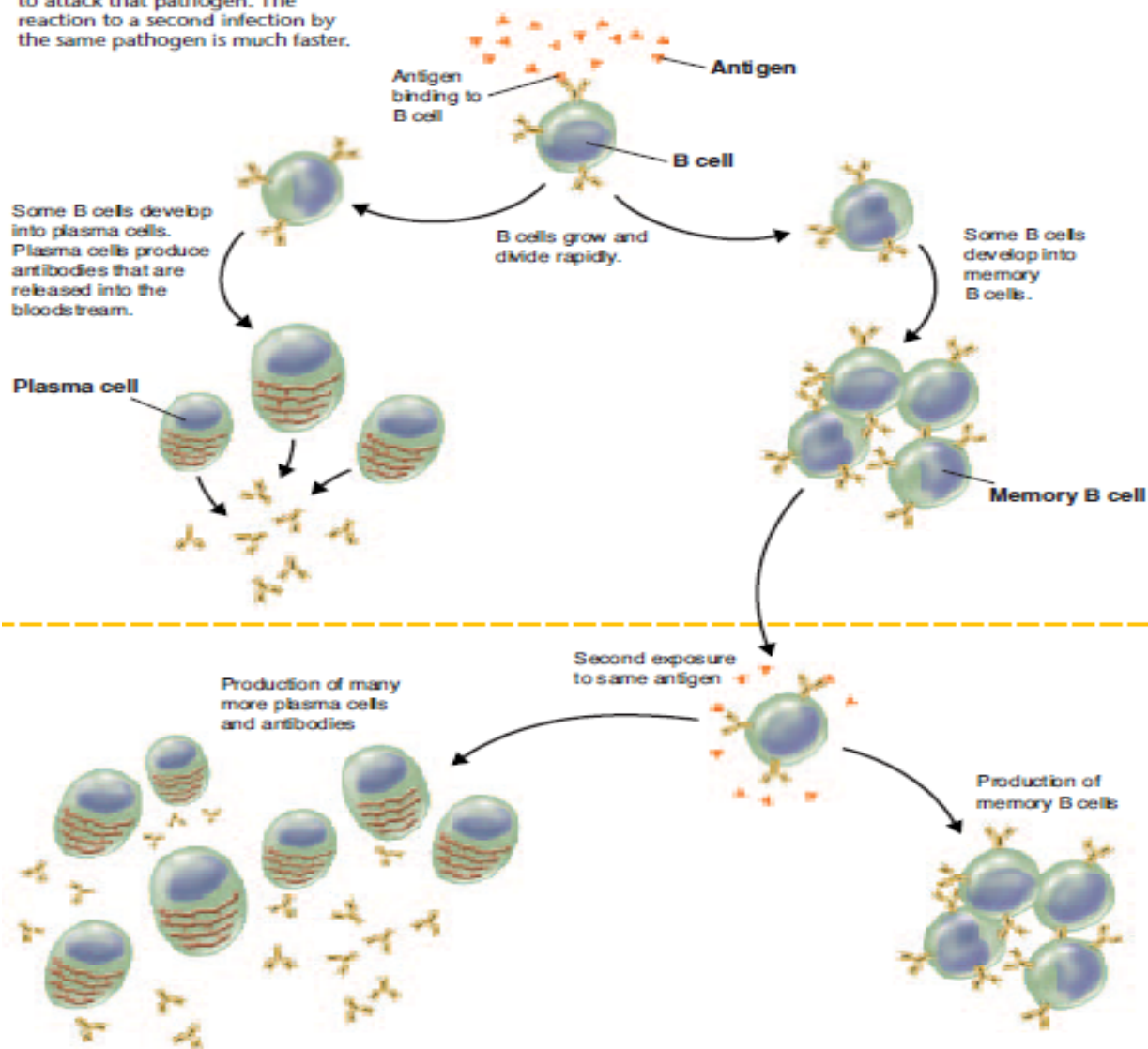
## B cells (aka B lymphocytes)

- type of white blood cell, produced and matures in the bone marrow
- attack pathogens that get by first line of defense ( called humoral immunity)
- found in the fluid surrounding the cells
- pathogens have special markers on them called antigens
- antigens are recognized by helper T cells which activate B cells
- B cells produce plasma cells and B memory cells
- plasma cells produce antibodies which bind to the antigen and prevent it from growing and reproducing



- memory B cells remain behind to attack the antigen should it enter again

Once the body has been exposed to a pathogen, it remains capable of producing specific antibodies to attack that pathogen. The reaction to a second infection by the same pathogen is much faster.



## T cells (T lymphocytes)

- type of white blood cell produced in bone marrow but mature in the thymus gland
- involved with cell mediated immunity
- fight pathogens inside cells (destroy cell)
- helper T cells activate killer T cells
- killer T cells - bind to and destroy cell containing pathogen
- memory T - cells are there to fight next time
- suppressor T cells slow down production of killer T cells

iii) Explain the various ways immunity can be acquired.

- genetics
- through breast milk
- vaccinations
- exposure to pathogen

Active Immunity - body produce antibodies against an infection (either by exposure or through a vaccination)

Passive Immunity - antibodies are injected - only help for short periods of time

iv) What is an allergic reaction? What roles do histamines play in allergies?

- over-reaction of the immune system
- allergens attach themselves to mast cells which release histamines
- histamines increase blood flow, fluids and mucous to the infected area
- excessive mucous leads to sneezing, runny nose, ect.

v) What is an autoimmune disease? Provide at least 4 examples that fit this category.

- body attacks it own cells
- ex. - type 1 diabetes (attack insulin producing cells)
  - rheumatoid arthritis (attack joints)
  - myasthenia gravis (attack muscles)
  - multiple sclerosis ( attack brain and spinal cord)
  - crohn's disease